

DUPUYTREN'S CONTRACTURE: THE TREND TO CONSERVATISM

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by

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DUPUYTREN'S CONTRACTURE OCCUPIES a prominent place in the field of hand surgery, not only because of its frequency, but because of the problems posed by the inexplicable nature of the pathological process involved. In this lecture I wish to present a philosophy of management of this condition based on our present still limited knowledge of its basic nature. The operations for correction of the deformity of Dupuytren's Contracture have ranged from a simple fasciotomy advocated as a sub-cutaneous procedure by Astley Cooper (1822) and described in detail as an open operation by Dupuytren (1834), through a limited fasciectomy as used by Kocher (1887) to the wide excision of palmar aponeurosis advocated by Kanavel (1929) and extended by Lexer (1931) to include the overlying skin. We shall see that each of these procedures can still claim a place in the current treatment of Dupuytren's Contracture.

It is not surprising, however, that the septic and vascular complications of these early procedures produced in most surgeons a reasonable reluctance to interfere with this essentially innocent condition until the meticulous technique of Gillies and McIndoe demonstrated that radical fasciectomy was compatible with first intention healing and the restoration of normal hand function. Excision of the whole of the palmar aponeurosis, based on Skoog's (1948) theory of causation by fascial microruptures was then practised until the past decade, when the hazards have been recognized of applying this radical operation indiscriminately to all patients with Dupuytren's Contracture.

A reassessment of the natural history and pathology of Dupuytren's Contracture has produced a return to conservatism, both in the selection of patients for surgery and in the extent of surgery performed.

Clinical presentations

The variety of clinical presentations of Dupuytren's Contracture makes it not unreasonable to suggest that we may indeed be dealing with more than one condition.

At present we group together under this single eponymous term at least four different clinical presentations.

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(a) *Senile type.* Usually with single discrete bands with only slowly progressing deformity and a disability to which the patient has had time to become accommodated. When surgery becomes necessary it is found that minimal procedures often produce spectacular and lasting improvement.

(b) *Middle-aged type.* Often multifocal with proliferative nodules in one or both palms and slowly developing thick bands which are brought for correction of the deformity much earlier than the senile type because the patient is usually still at work and requiring full hand function.

(c) *Young "fulminating" type.* Often first seen with tender palmar or digital thickenings over which the skin may be slightly reddened and in which the hands are often sweating, pink and warm, suggesting changes in vasomotor activity. These patients usually have other lesions which are now recognized as having similar histological structure to the palmar lesions, namely knuckle pads, plantar lesions, and sometimes deposits along palmaris longus or about the insertion of flexor carpi ulnaris. Because a family history is the rule in these young patients (Ling, 1963), the term "Dupuytren diathesis" can be justifiably applied. There is a prolonged active phase of deposition of fibroplastic tissue in the palm and often in all the fingers of both hands, and for this reason the prognosis from surgery in this group is poor (Fig. 9).

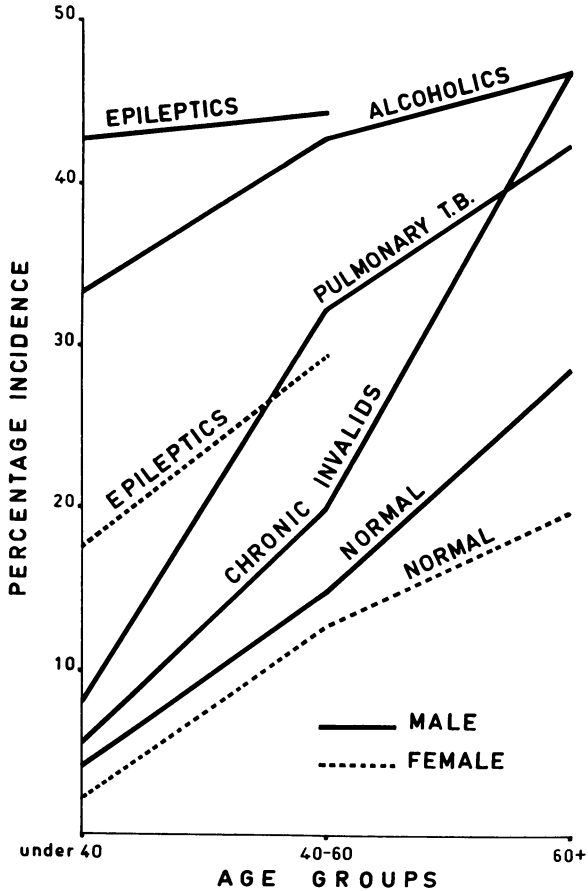
(d) *Feminine type.* With longstanding localized palmar plaques without deformity. There may be slender bands developing in relation to these plaques, often very superficially placed and producing digital deformity less often than in men. This "feminine" type is occasionally seen in men with a small delicate type of hand structure.

In our present state of ignorance of the true nature of Dupuytren's Contracture it is reasonable to retain all these patients in the same broad group. We may regard the changes as essentially the same in all groups, being modified by age and sex and, most significantly, by heredity.

The rise in incidence with age (Fig. 1) is such that, at least in Anglo-Saxon communities, more than 25 per cent of men over 60 years are affected to some degree (Early, 1962; Hueston, 1960, 1962). This clearly makes it necessary to select an optimum time for surgery rather than to advocate operation indiscriminately.

Other factors which appear to influence the incidence and severity of Dupuytren's Contracture are, in order of importance, epilepsy where over 40 per cent of adult males are involved, alcoholism and pulmonary tuberculosis, each of which approach this figure in the later age groups (Fig. 1). There is also evidence that a period of decreased hand activity short of total paralysis is often associated with the onset or progression of Dupuytren's Contracture. These clinical associations have an important bearing

on the assessment of each patient's progress both with and without surgery. Their assessment along with that of the strength of the diathesis as indicated by the family history and ectopic deposits is essential before deciding on an operation.



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Fig. 1. Age incidence.

In the natural history of Dupuytren's Contracture, the progression is often phasic, so that an episode of activity may be followed by many years of almost indiscernible progress. This factor, particularly in those later decades when more serious diseases may be incurred, suggests that a period of observation may be judicious unless the disability be severe.

This background of the patient's general state in relation to his disability determines both the timing and the extent of the operation.

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Pathology

In a hand with Dupuytren's Contracture the pathological changes are frequently so widespread that their total removal would pose an impossible surgical task. An understanding of the nature of these changes lends perspective to our planning of the time and the extent of surgical intervention.

A study of the early changes in Dupuytren's Contracture suggests that the subcutaneous fibro-fatty tissue or hypodermis of the palm may be at

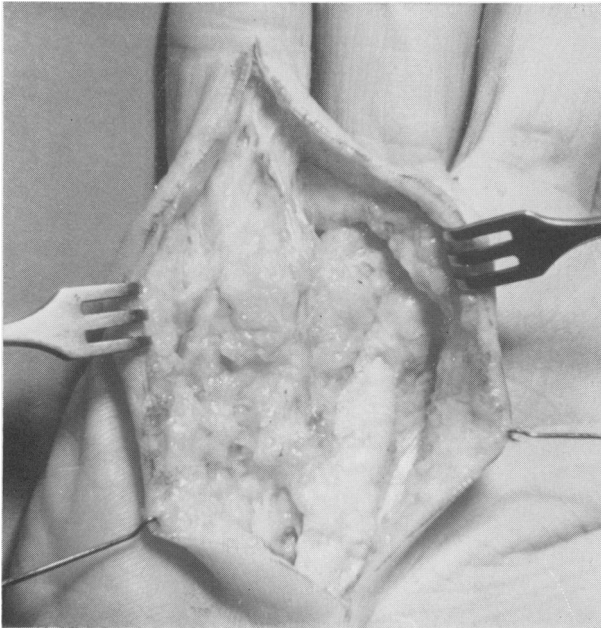


Fig. 2. The macroscopic appearance of the nodules, suggesting an origin within the fibro-fatty subcutaneous layer of the palm.

least as important as the palmar aponeurosis at the site of the initial fibroplasia (MacCallum and Hueston, 1962).

A study of the later changes supports Luck's theory (1959) that the fascial bands are secondary to the proliferative foci. Flexion deformity is only produced when this new centripetally contracting tissue acts across a joint. Surgical correction of the contracture would thus rationally be limited to this locally deforming mechanism.

At operation (Fig. 2) there is macroscopic evidence as soon as the skin is incised over a palmar nodule to demonstrate that the pale mass of firm,

proliferative tissue lies within the subcutaneous fatty layer and is a change *in situ* of a predominantly fatty region to a predominantly fibrous region. This simple observation may be as far as we can proceed at present towards understanding the first changes of this condition, but its significance lies in the placement of these changes in that part of the hand where, as a defatted preparation of the palmar fibrous structures shows, the aponeurosis is most poorly represented (Fig. 3). Extension of the process from the primary nodule may then involve all the palmar structures between the aponeurosis and the dermis, and it is the more superficially placed longitudinal fibres of the palmar aponeurosis which are first directly involved.

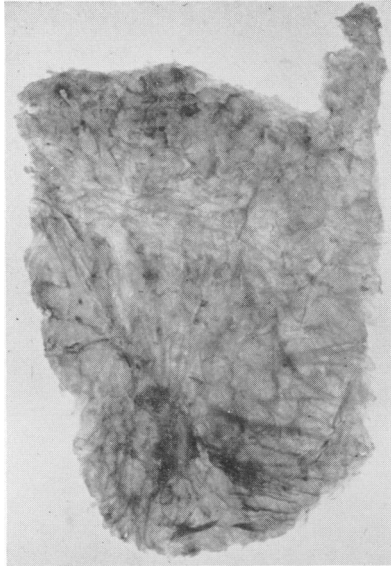


Fig. 3. The entire subcutaneous tissues of a palm including aponeurosis, defatted with benzol.

A frequent feature of the pathology is the freedom from direct involvement of the transverse fibres on the deepest aspect of the aponeurosis. Nodules have not been seen in the fatty or fibrous structures deep to the plane of the aponeurosis.

The significance of the large Pacinian corpuscles seen at this level is not yet clear.

The production of a longitudinal band has been attributed by Luck (1959) to work hypertrophy of a longitudinal fasciculus of the aponeurosis which contains a shrinking nodule and this hypothesis is supported both by the band often being free from diffuse fibroplastic activity and by Skoog's demonstration (1948) by electron microscopy of an increase in collagen fibre diameter.

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Defects up to 3 cm. can be demonstrated at open fasciotomy, and comparison of the resected band with the defect will support this observation. This degree of shortening which occurs is so great that further study is

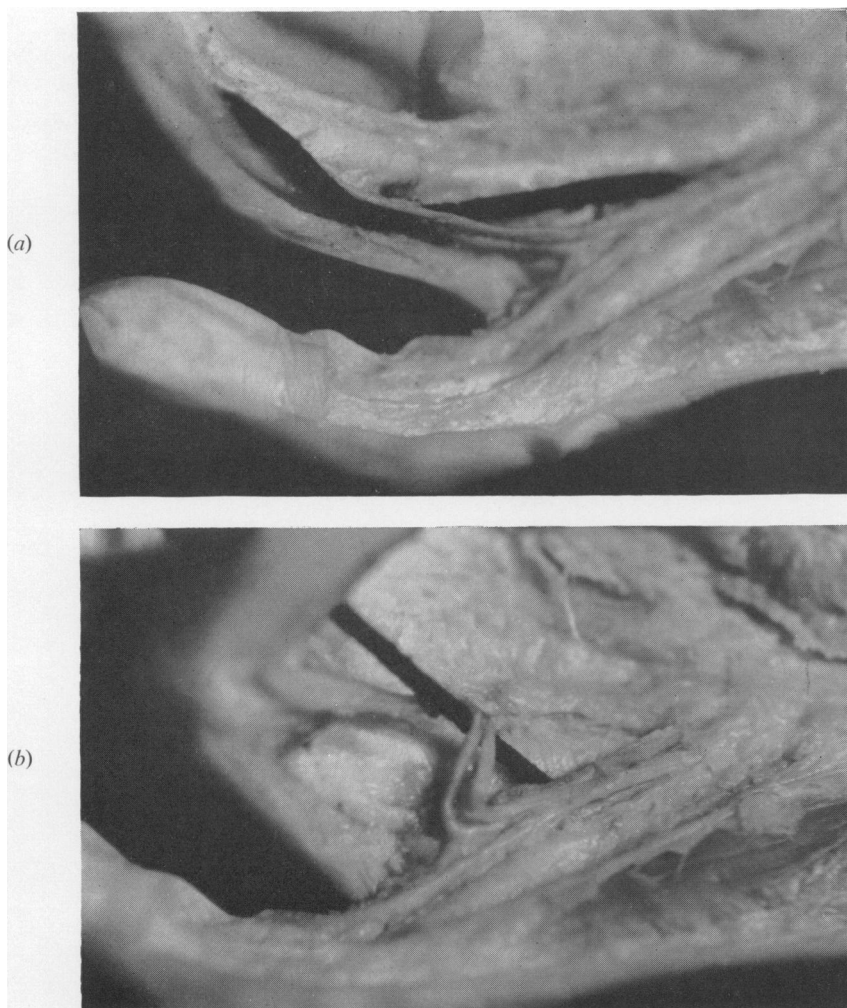


Fig. 4. A mechanism for displacing the digital neurovascular bundle is demonstrated by a black cord which represents fibrous strands normally passing into and along the sides of all fingers.

clearly necessary to clarify the precise mechanism of such gross contracture.

The process of shortening can only produce skeletal deformity when acting across a joint. It is the involvement of different pre-existing

anatomical fibrous strands and septa that accounts not only for the common skin pits but also for the infinite variety of band arrangements and digital nerve displacements that may be found. In particular the displacement of a digital nerve to the subcutaneous plane in the distal palm, which was first described by Iselin (1954), can be explained on the involvement of Cleland's skin ligament in the contracture and, along with the progressive flexion deformity produced by contraction of such a band (Fig. 4*a* and *b*), a sliding of the digital nerve along the surface of this band from

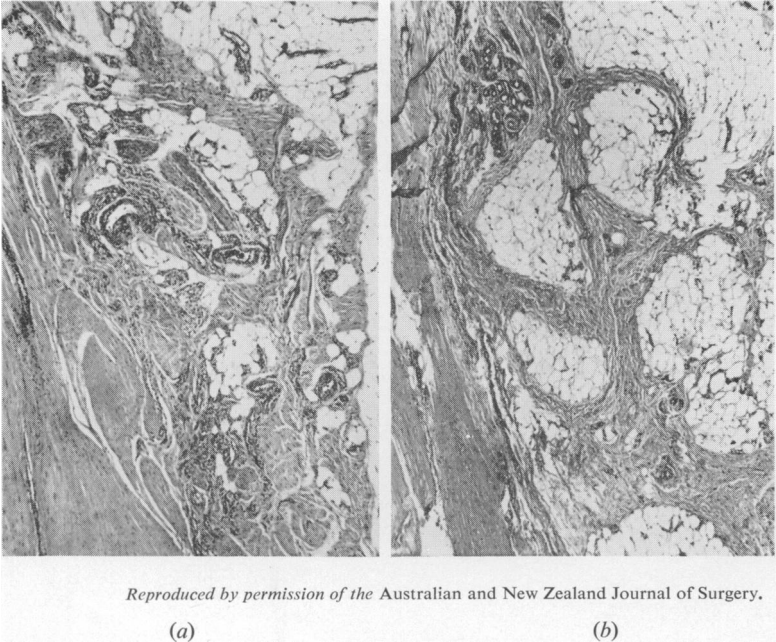


Fig. 5. Photomicrographs at the margin of the palmar nodules, indicating a fibrous replacement of the fat loculi, and increased vascularity.

its original level beyond the web space to lie immediately beneath the dermis just beyond the distal palmar crease. At this point it may be accidentally divided in any operation, but particularly in subcutaneous fasciotomy.

Histological examination of the margins of a palmar nodule may be reasonably expected to give some idea of the early changes of the fibroplastic process involved and of its mode of extension (Fig. 5*a* and *b*).

A feature is the great vascularity of the adjacent subcutaneous tissue, but our knowledge of the normal vascularity of the different planes of the

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hand is still so scanty that it would be presumptuous at present to assert to what degree the number of vessels is actually increased.

The margins around the hyperplastic nodule, between it and the normal fibro-fatty palmar tissues, show a replacement of fatty loculi with fibrous tissue. The fibroblasts are produced locally from the perivascular cuff of undifferentiated cells. The study of the local ground substance in this zone may help establish a better understanding of the nature of this condition.

The extension of this process into the dermis helps to explain the enigma of recurrence after excision of the aponeurosis.

This change from a "mechanistic" to a "metaplastic" attitude in appraisal of the surgical pathology of Dupuytren's Contracture has produced a change in perspective regarding the surgery required (Hueston, 1963).

Selection of patients for surgery

Only a small proportion of patients with Dupuytren's Contracture require surgery. The early nodule, unless so tender as to be disabling, is left to demonstrate the rate of progress in that particular patient. A feature of the natural history is the phasic rate of progress, in which such a nodule may remain unchanged for decades or even regress slightly. Non-surgical therapy is therefore difficult to assess but appears to be ineffective.

TABLE I
PROGNOSTIC CLASSIFICATION

Palmar nodule only	..	..	no operation
M.P. deformity	..	..	always correctable
I.P. deformity	..	..	often uncorrectable

A classification based on the degree of deformity can be used as a guide to the results that can be expected from surgery (Table I). A possible anatomical explanation for the difference in prognosis at the different joint levels may lie in the different proximal attachments of the anterior capsular ligaments. In the uncorrectable proximal interphalangeal joint deformity the arcuate ligament at the proximal border of the anterior capsular plate is shortened and fixed to the sides of the neck of the proximal phalanx. This is not possible at the metacarpo-phalangeal level because of the origin of the interosseous muscles. In practice the patient with metacarpo-phalangeal flexion can be offered full correction, but proximal interphalangeal flexion will often be short of full correction.

Excess trauma to the proximal interphalangeal joint is avoided, because retention of full flexion is more useful than a straighter but stiffer finger.

The band with only mild metacarpo-phalangeal deformity in the elderly patient is rarely causing sufficient disability to warrant surgery. A finger severely flexed into the palm of an elderly man is also surprisingly well accommodated. Such patients usually decline surgery.

Therefore surgery is reserved for those hands in which a real disability exists and in most cases is restricted to correction of the deformity causing that particular disability. Because the deformity can only occur at the three joint levels of the finger, surgery is directed to dissection of the

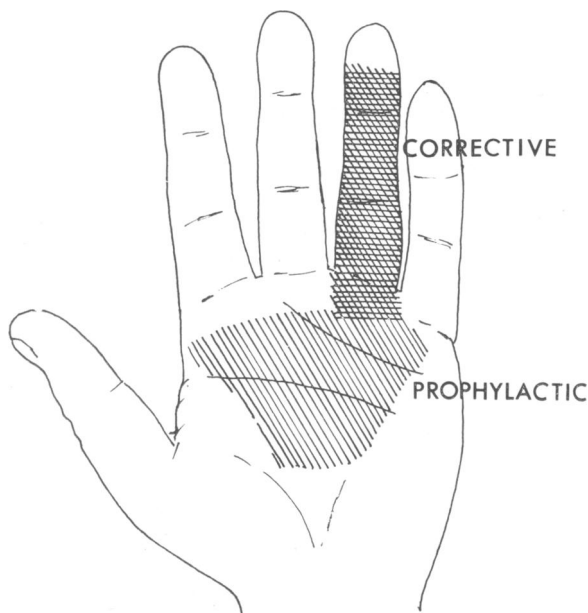


Fig. 6. Diagram to compare the extent of dissections for a band deforming the ring finger; a limited "corrective" fasciectomy and a radical "prophylactic" fasciectomy.

deforming bands acting at these joint levels. It is essentially, therefore, a digital dissection.

The concept of a prophylactic operation (Fig. 6) to clear the whole palm of the tissue of origin of Dupuytren's Contracture was based on the concept of the palmar aponeurosis being the sole tissue of origin of the condition.

Prophylactic excision based on the present concept of the tissue of origin would involve excision of the palmar skin and subcutaneous tissue along with the aponeurosis, and free grafting the entire palm, as was originally advocated by Lexer (1931).

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In favour of adopting a more conservative surgical approach is the facility for regression shown by palmar bands and even nodules when Luck's vicious circle of tension is broken. In simple fasciotomy this benefit may be only short lived if the divided ends of the band become reunited by scar through which tension can be re-exerted. The introduction of a Wolfe graft into the defect left by such an open fasciotomy, made on generous proportions without any excision of tissue, has been followed by regression of both band and nodules.

Fasciotomy, whether subcutaneous or open, cannot be safely used in the finger, and its principal use is in the palm for the correction of metacarpophalangeal joint deformity in the elderly.

Fasciotomy is required for proximal interphalangeal joint deformity because of the unpredictable and intimate relations of the digital nerves to the deforming bands.

When fasciotomy is decided upon, the extent is determined by considerations of (a) correction of the disability, (b) the concept of prophylaxis, (c) the operative morbidity in relation to the extent of the surgery, (d) the chances of recurrence in relation to the extent of surgery.

The only difference between a radical and conservative operation (Fig. 6) is in the extent of the palmar dissection. Digital dissection will be required for interphalangeal joint deformity in any case. Extending the operation to a radical palmar clearance may be justified by a lower palmar recurrence rate, but limiting the dissection to the level of the distal palmar crease is sufficient to allow full correction of both joint deformities, and the abnormal tissue left in the proximal palm, being remote from any joint line, is unlikely to produce later deformity. New digital lesions would require repeated surgery whatever the extent of the original dissection.

Results of surgery

An assessment of the relative merits of the various operations for Dupuytren's Contracture has been made on a personal series of 322 operations, on which the follow-up exceeds two years (Table II). Fasciotomy was reserved for the senile type, and in this small series of 17 patients the average age was 71 years. A small longitudinal incision allowed exposure of the superficial aspect of the band and avoided inadvertent division of a superficially displaced digital nerve in the palm. Fasciotomy in the finger was not performed because of this hazard.

It is clear that a prejudice existed in favour of limited fasciotomy throughout this surgical series. The radical procedure was reserved for a diffuse palmar involvement in a young person with commencing deformity of more than one finger. This group included those with fulminating disease.

The elderly, middle-aged or feminine types with multi-focal lesions in the palm and deformity of only one finger would still have had only a limited excision of the deforming mechanism. It is necessary to establish this basis for the choice of operation in this surgical assessment because subsequent surgery has been surprisingly rare in these more elderly patients with a lower diathesis, despite this deliberate restriction of the dissection.

Mere uncorrectable proximal interphalangeal joint deformity was not regarded as an indication for amputation. Correction of the metacarpophalangeal joint deformity could nearly always be achieved by dissection in this distal palmar region. When the metacarpophalangeal joint can be hyperextended, quite severe proximal interphalangeal deformity can be tolerated.

TABLE II
OPERATIONS WITH MORE THAN TWO YEARS FOLLOW-UP

<i>Primary</i>				
Fasciotomy	..	..	..	17
Limited fasciectomy	..	..	..	229
Radical fasciectomy	..	..	..	15
Primary amputation	..	..	..	12
<i>Secondary</i>				
Fasciectomy (including digital Wolfe grafts, 14; amputations, 17)	..	..	..	49
				<hr/> 322 <hr/>

The secondary fasciectomies performed for extension and recurrence included 14 digital Wolfe grafts, and in many cases these were instrumental in conserving a digit whose volar skin would no longer have permitted adequate correction of deformity after excision of the recurrent tissue. The amputations were performed for uncorrectable interphalangeal joint deformity where the disability was aggravated by inability to hyperextend the metacarpophalangeal joint.

Complications of surgery

The subsequent assessment of the early and late results of surgery for Dupuytren's Contracture (Table III) is based on a comparison of the limited and radical fasciectomies in this series, but includes the results of radical surgery previously reported (Hueston, 1961) and the results so carefully documented by Mortimer Shaw (1957 and 1962).

Permanent limitation of full flexion of the fingers can be precipitated in elderly people by the most trivial injuries and operations and occurs after fasciectomy regardless of the extent of fasciectomy. It is commoner in women than in men and would appear to be related to the individual's hand physiology rather than to the extent of the injury sustained at

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operation. That it can follow such a trivial injury as fasciotomy makes it reasonable to avoid surgery whenever possible in those people we suspect to be predisposed to this complication. These patients are women, men with effeminate, fine hand configurations, epileptic and arthritic patients.

The incidence of haematoma in the hand is less with smaller areas of dissection. The greater the extent of the wound, the greater the area from which post-operative oozing may occur. The commonest site for haematoma to collect is in the hollow of the palm, and an advantage of limiting the dissection to the distal crease line is the avoidance of this danger zone.

TABLE III				
POST-OPERATIVE COMPLICATIONS				
	<i>Number of operations</i>	<i>Haematoma</i>	<i>Skin necrosis</i>	<i>Limitation of full flexion</i>
Fasciotomy ..	17	—	—	2
Limited fasciectomy	229	16 (6.9%)	6 (2.6%)	29 (12.7%)
Radical fasciectomy:				
Personal series ..	15	4	2	3
Leeds series ..	222	31 (13.9%)	30 (13.5%)	38 (17.1%)

The blood supply to the skin of the centre of the palm has a principally marginal origin, and the greater the extent of the palmar dissection the more precarious becomes the blood supply to the margins of a long transverse wound. In the fingers the Z-plastic manipulation of the margins of a wound after a nodule has been dissected from an intimate relation to the dermis also calls for extreme care in the assessment of dermal circulation. Necrosis of part of a transposed Z-plastic is the usual cause of skin necrosis in a limited fasciectomy.

Such morbidity is proportional to the extent of the surgery.

This is important to consider in terms of "economic loss" to the patient. It should be possible to advise the patient, before the operation, when he can expect to be able to return to work. Office workers frequently return to work within a week with the dressings still in place, but when the hand is needed to hold tools it must not only be soundly healed and free of dressings but capable of firmly flexing all the fingers into the palm. Such manual workers are usually advised to apply for three or four weeks' leave from work.

Thus, when advising limited fasciectomy, the possibility of secondary operations for extension or recurrence is accepted, in exchange for the lower morbidity rate and this shorter convalescence.

In this series of 229 limited fasciectomies, slightly less than 90 per cent could flex the fingers to the palm within six weeks. It is, however, interesting to note that, of the 32 patients who could not flex the fingers firmly

and fully into the distal palmar crease at the end of six weeks, 29 remained permanently unable to do so to some degree. This group of patients showed no higher incidence of wound morbidity.

Late results of surgery

The assessment of the late results of surgery for Dupuytren's Contracture (Table IV) in relation to the progress of the disease itself is a matter for the careful enunciations of definitions and the utmost attempts at uniformity of observation if the conclusions are to be capable of comparison.

TABLE IV
LATE RESULTS (EXTENDED SERIES)

		<i>No. of patients</i>	<i>Clear</i>	<i>Extension</i>	<i>Recurrence</i>
Limited	..	202	101	48	53
Radical	..	35	8	13	14

A patient is designated "clear" if no new deposit has been formed in the operated hand since the operation. An "extension" is the laying down of new deposits beyond the area cleared at operation. A "recurrence" is defined as the appearance of new deposits within the area cleared at operation, and, in these tables, "recurrence" also includes patients with those hands showing extension as well as recurrence. Table IV shows patients, not operations.

Progress of the condition, whether by extension or by recurrence and extension, was, allowing for the disproportion between the two groups of patients, probably higher in the radical group. This was almost certainly due to pre-selection of this group, as being young people with actively progressing multi-focal palmar disease and therefore those most liable to further progress.

TABLE V
LATE RESULTS (EXTENDED SERIES)

		<i>Extension predominantly</i>		<i>Recurrence predominantly</i>	
		<i>Digital</i>	<i>Palmar</i>	<i>Digital</i>	<i>Palmar</i>
Limited	..	20	28	42	11
Radical	..	10	3	4	10

The extension and recurrence rate is misleading when not considered separately in the digital and palmar regions (Table V) and has previously led to a conclusion (Hueston, 1961) not fully supported when thus dissected.

While extension often occurred in both the digital and the palmar areas, the patients have been re-grouped according to which region was predominantly affected at the time of review. While the rate of extension is not significantly changed by this analysis, it is clear that recurrence after

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limited fasciectomy is commoner in the digital fields than in the palm. Two factors influence these figures, first the inverse proportions of digital area to palmar area of dissection in the two operations and secondly the preselection of patients with a greater diathesis for the radical operation.

Secondary surgery

The significance of the separate consideration of digital and palmar progression becomes clear when related to the frequency of secondary surgery required (Table VI). It is to be expected that progress of the disease in the digital fields would require secondary surgery more often than progress in the palmar area. Palmar recurrence only occasionally produced deformity and this is presumably related to the absence of longitudinal fibres after the original clearance. Thus a palmar recurrence is usually of academic interest and only rarely requires excision.

Extension in the form of the abductor digiti minimi band has been regarded in this context as a digital extension.

TABLE VI
SECONDARY SURGERY

	<i>No. of operations</i>	<i>Digital Wolfe Graft</i>	<i>Amputation</i>
Digital extension ..	15	2	2
Digital recurrence ..	26	12	15
Palmar extension ..	5	—	—
Palmar recurrence ..	3	—	—

In those patients with uncorrectable and disabling digital deformity, amputation was performed to allow the most rapid recovery of hand function. This may be expeditious in the aged and economic in the younger age groups. The little finger has the worst prognosis, this being related to the overall frequency of the disease and of recurrence in this region.

Recurrence

In the study of recurrence of Dupuytren's Contracture must lie the greatest chance of elucidating the aetiology of this condition, because here it is literally re-forming under our observation. Three features of recurrence are to be noted. It is commoner in younger age groups, in association with knuckle pads, these being taken as a measure of a stronger diathesis, and, finally, it is usual for recurrence to become evident within 12 to 18 months of operation (Hueston, 1962).

Recurrence must be either from failure to remove all the active tissue or by persistence of a local tissue capable of reacting to whatever factor causes the pathological change. When the skin is elevated a plane is determined between the visible pathological tissue and the dermis, with caution being taken to preserve the dermal circulation. When it is recalled that the dermis may be directly involved (Fig. 7a), the possibility of retaining active foci is clear.

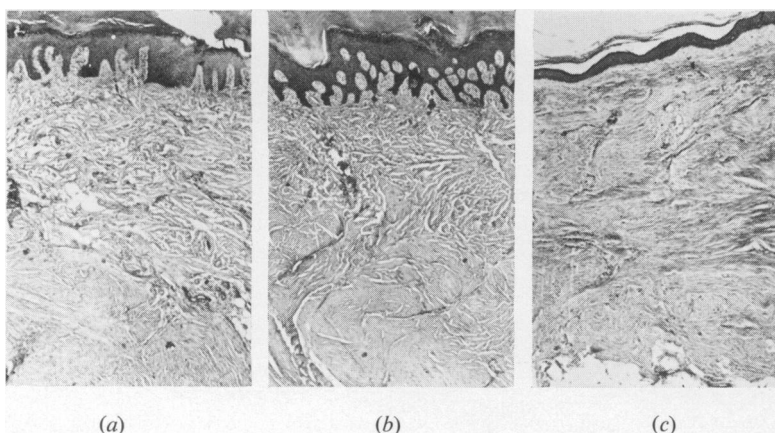


Fig. 7. Photomicrographs to show the relationship to the overlying skin of (a) a virgin nodule, (b) a recurrent nodule, (c) scar beneath a digital Wolfe graft after three years.

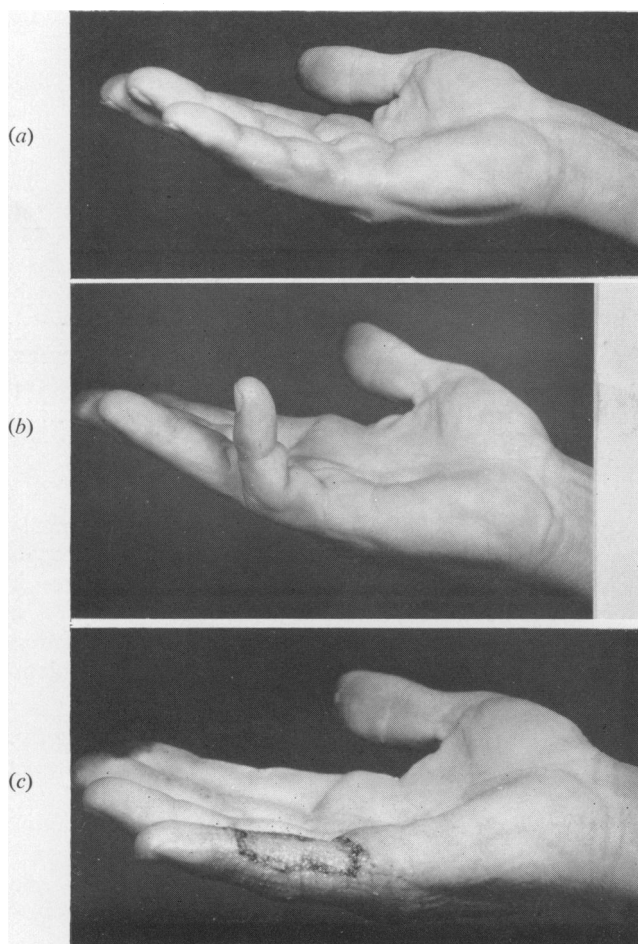


Fig. 8. Rapidly progressing little finger deformity over 9 months (a and b) in a young alcoholic treated by a primary Wolfe graft (c).

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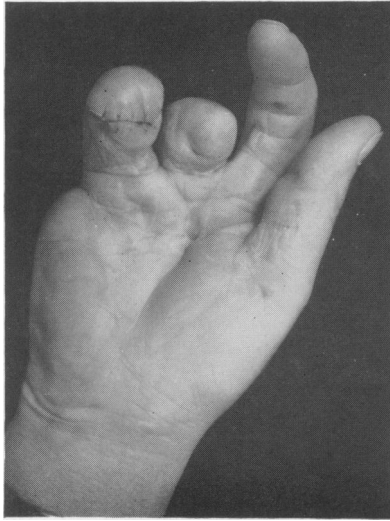


Fig. 9. Mutilation forced by repeated recurrences of fulminating form in a young man, nine fasciectomy in 10 years. The patient is now aged 41 years.

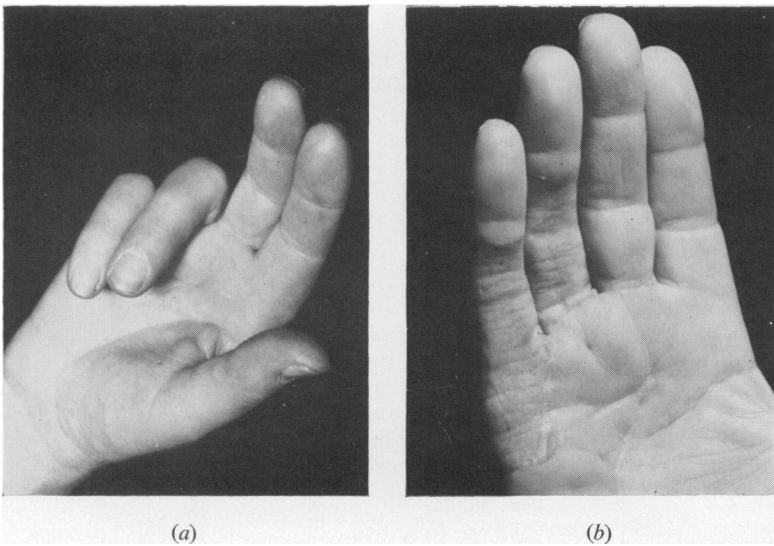


Fig. 10. (a) Gross deformity in a man of 45 years with strong diathesis. (b) Ring and little fingers have been resurfaced with Wolfe grafts after primary excision of the deforming mechanism and overlying skin.

Recurrence beneath digital skin flaps is seen (Fig. 7b) to be continuous with the dermal stroma. Thus it appears to be the replaced skin rather than retained deeper foci which is responsible for the recurrence. This contention is supported by the failure of recurrence to appear when the digital skin has been replaced by a Wolfe graft (Fig. 7c).

This failure of recurrence to appear beneath a Wolfe graft makes it necessary to postulate a possible benefit, not only in removing the entire subcutaneous layer from a digit, but also the dermis with the hypodermis.

It is possible that the local control of recurrence by whole skin replacement may have a place in the management of those patients with a strong diathesis.

Therefore when a poor prognosis is predicted, such as in a young alcoholic patient with a strong diathesis and a progressive digital deformity in the little finger (Fig. 8a and b), it is rational to proceed directly to a primary Wolfe graft (Fig. 8c). Technically a primary Wolfe graft replacement is simpler and safer than is a secondary Wolfe graft after multiple recurrences, particularly in the safe exposure of the flexor tendon sheath. Thus by anticipating and preventing recurrence it may be possible to save these digits from amputation.

The gross mutilations forced by the fulminating form of this disease (Fig. 9) may thus possibly be forestalled (Fig. 10).

Conclusions

The concept of metaplasia in the superficial palmar tissues as the basis of the pathology of Dupuytren's Contracture has led to a change in emphasis in the surgical approach.

An appreciation of the phasic progress in the natural history of Dupuytren's Contracture has led to a conservatism both in the selection of patients for surgery and in the selection of surgery for each patient.

The possibility of control of the "fulminating" form of this disease by the use of the whole skin grafts is suggested.

The disability which follows complications of surgery may be worse than the original disability of the Dupuytren's Contracture.

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